APPRAISAL BULLETIN

PUBLISHED IN THE INTERESTS OF REAL ESTATE ANALYST SUBSCRIBERS BY

ROY WENZLICK & CO.

Real Estate Economists, Appraisers and Counselors

SEPTEMBER 16
1949

Volume XVIII

Copyright 1949- by ROY WENZLICK & CO. - Saint Louis

Number 41

A BETTER METHOD FOR FINDING REPRODUCTION COST OF TYPICAL RESIDENCES

APPRAISING property is still essentially an art. At best, an appraisal is a man's opinion of value, arrived at through careful observation and study. The sincere appraiser continually strives to better inform himself and to equip himself with economic tools in order to reduce his art to a more scientific basis. One of our functions is to supply appraisers with the research information which will aid in formulating good judgments and give a basis for arriving at appraised values which are more scientifically related to true value.

In this bulletin we wish to tear down an old, but cherished, "rule of thumb," and replace it with something better. The erroneous opinion held by many and used to an astonishing extent is this: Let's say that an appraiser is on friendly terms with a local builder. He asks the builder for, and receives, the actual cost, to the penny, of an actual house. He is told that the house cost $10,000 exclusive of architect's fees, land, land improvements, etc. The appraiser then borrows the blueprints and computes the cubic content (or square feet of area if he chooses that method) and finds that the house contains, let us say, 20,000 cubic feet. By simply dividing $10,000 by 20,000 cubic feet, he determines that the cost of building this particular house amounts to 50¢ per cubic foot in his local market as of that date. Then he jumps a terrific abyss in logic and concludes that 50¢ per cubic foot is "today's price in his market" for other houses of similar design, quality and workmanship.

An appraisal job comes along involving a house which looks as if it were similar in every respect to the house on which he has the newly acquired information as to cost, amounting to 50¢ per cubic foot. But, the house under appraisement contains 25,000 cubic feet. Happy in the thought that he has recent cost figures on a house of similar quality, materials and workmanship, our hero multiplies 25,000 by 50¢ and prices the house at $12,500 (in which he is dead wrong) and proceeds to add on appropriate amounts and percentages for architect's fees, land, drives, planting, etc. He may not be far wrong, but he is wrong both in theory and in practice!

The basic error in the application of a cost per cubic foot or cost per square foot from one house to another is that the cost of a building, even though similar in every other respect, does not vary directly as the cubic content or the area varies.

Let us examine briefly some of the more obvious reasons why costs per cubic foot do not vary directly as the cubage changes (or costs per square foot, as the area changes). We are all agreed that the costs of building houses are tied very closely to what goes into the houses. Costs can and do change substantially with changes

in specifications. Costs change from city to city not only because of different labor rates and material prices, but also because of differences in building codes and differences in standards of practice. The number of bathrooms, chimneys, or corners directly enters into the cost of building a house. But the costs of these and other items influence the total cost of a small house to a considerably greater extent than they influence the cost of a large house.

Perhaps it would be well to develop this thought further. Brick contractors invariably "double the corners" when they estimate brick work. Carpenters on frame houses likewise must make additional charges for framing in and bracing corners. With fairly uniform ceiling heights these days, it becomes manifest that the cost of a corner is an item which does not vary directly with the cubic content or area of a finished house.

The cost of the heating plant and the installation of that heating plant in a small home is, of course, somewhat less than the cost and installation of a heating plant in a very large home. But it costs more per cubic foot and per square foot in the smaller house!

The cost of installing a bathroom of a certain quality is almost the same regardless of the cubic content or the area of the house in which it is installed. The cost of installing the utilities from the service mains to the house depends upon the distance which the house is set back from the street, not upon the size of the house.

The electric wiring of a house costs a little bit more in a large house than in a small house but not in direct ratio to the size of the house. The kitchen sink and cabinets are pretty much a single cost item depending upon the quality of the merchandise. The costs of these do not vary with the size of the house.

In summary we must conclude that plumbing, heating, electrical and other equipment in a small house cost more per cubic foot or per square foot of that small house than the same identical items cost per cubic foot or per square foot of a large house. Any appraisal which is made without taking cognizance of the factors which do not vary with the area or cubic content is not made on a scientific basis even though it may result, by happy accident, in a fairly accurate valuation.

Our organization has published for many years breakdowns of costs per cubic foot and per square foot for certain typical houses. We were among the first to publish our estimates of unit costs for basement volume as differentiated from living-space volume and as differentiated from attic volume. At periodic intervals we have quoted actual costs for these different types of space and shown how we have by weighted averages presented our cost per cubic foot and per square foot for a specific house. Our reason for bringing this into the discussion at the present time is to point out that the costs per cubic foot which we quote in our Trends Bulletins from time to time are accurate in detail and in total, and are based upon a more extensive research than is normally undertaken; but these figures which we publish apply to specific houses in a specific market and at a given instant of time.

Our costs per cubic foot which we regularly publish are intended to give basic cost data to the appraiser and not specific cost data unless, of course, the house under appraisement is identical with one of the Wenzlick "guinea pig" houses.

The purpose of this bulletin is to make our research in the cost field more universally applicable than has heretofore been possible. More pointedly, this bulletin is intended to give relatable cost data which will transcend differences in area, space, time, and location for other houses which you may have to appraise and which are similar to the Wenzlick "guinea pig" houses in plan, specifications, quality of material and workmanship, but different in size, time, and location.

THEORY BEHIND THE COST CURVES

Divested of its complicated derivation, we find that the cost per cubic foot of a house and/or the cost per square foot of a house increases as the house becomes smaller and decreases as the house becomes larger. If we permit our thinking to drift off into the realm of the ridiculous, we can imagine an extremely small house (doll-house, if you will) which is complete with plumbing, electricity, perfect in architectural detail, and in every respect livable for a family of tiny midgets. The cost per cubic foot would, of course, be astronomically high depending upon how far we wish to go to this extreme with our thinking. In fancy again, if we would go to the other extreme and build a house with the same number of rooms and with, let us say, the same one bath, one kitchen, etc., but otherwise larger than our homes are normally built, we would find that the cost per cubic foot, or the cost per square foot, would be fairly low although it would never approach zero (as our small house could approach infinity).

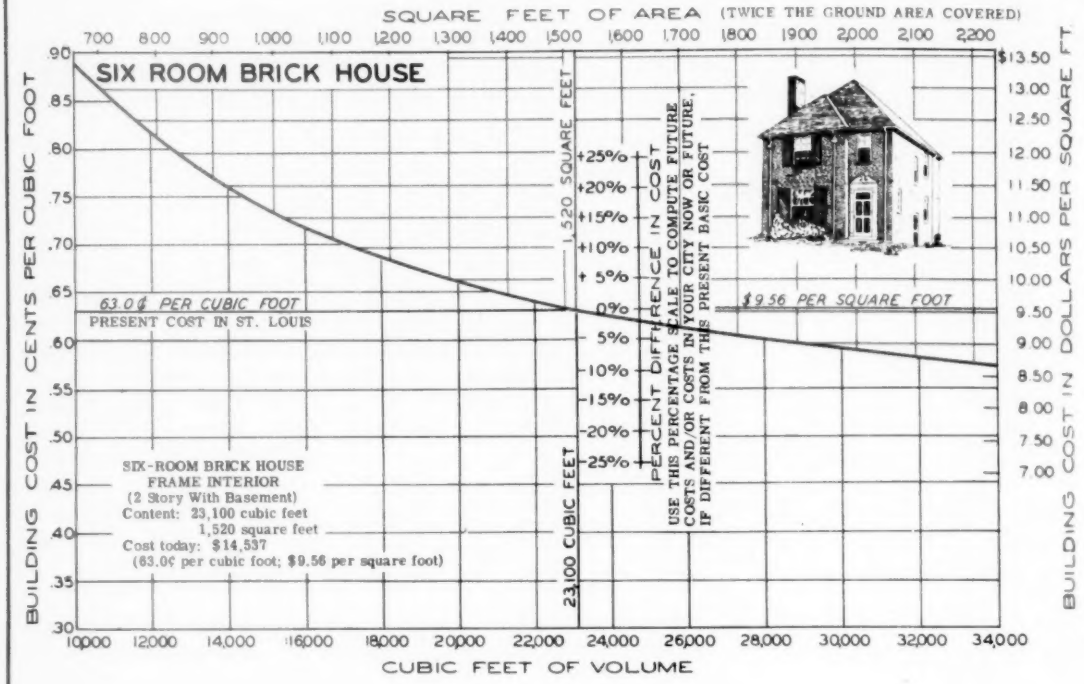
The curve of cost per cubic foot or cost per square foot seems to follow in part the general shape of an equilateral hyperbola or an exponential curve. However, within the realm of practical application we are only interested in a small portion of that curve. Our purpose in going back to the pure theory is to be sure that we can identify the general nature of the curve, or to see if in truth it follows a curve at all. Having established this, we next want to find what portions of these curves apply to the amounts of living space and living areas which people require and demand in their homes.

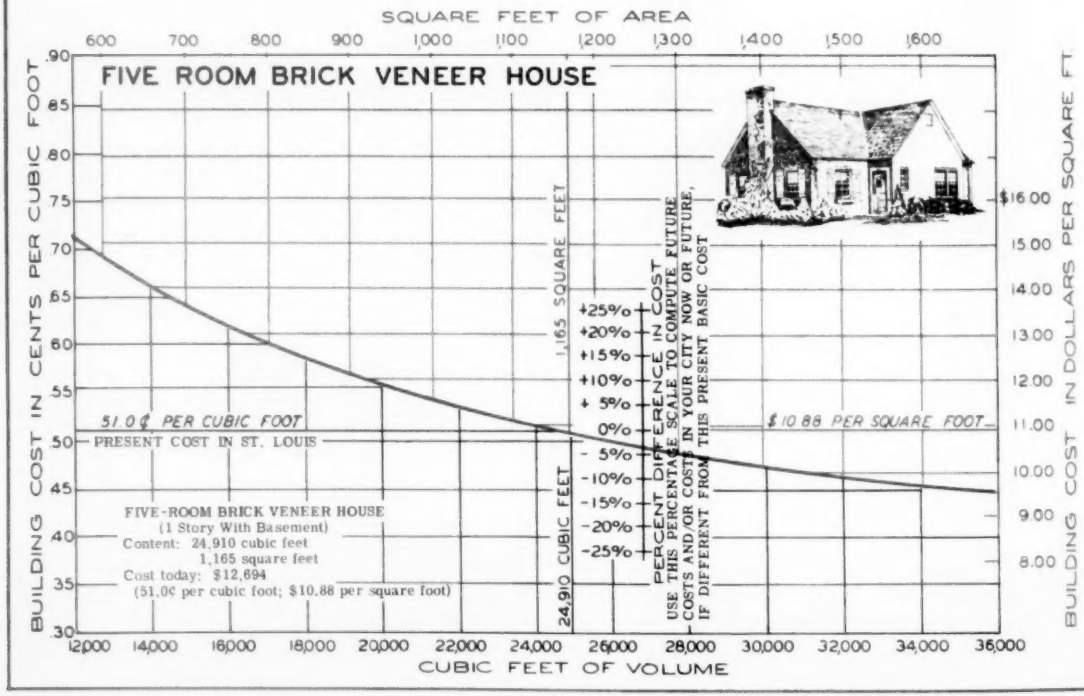
In order to present something specific and usable, we have limited ourselves to the four Wenzlick "guinea pig" houses, and have studied the cost-curves of the two-story buildings from 10,000 cubic feet to 34,000 cubic feet, or from an area under 700 square feet to more than 2,200 square feet of floor area. For the one-story five-room brick veneer house, we studied its cost-curve from 12,000 cubic feet to 36,000 cubic feet of volume and from less than 600 square feet to more than 1,600 square feet of area. The cost-curve for the one-story California-type bungalow without a basement was studied from 6,000 cubic feet to 20,000 cubic feet of volume and from a little less than 500 square feet to more than 1,600 square feet of area. These limits were selected because they cover the practical dimensions for the type of architecture involved. Furthermore, although our appraisal file contains over 7,000 appraisals, we have very little to go on as a basis for study beyond the dimensions described.

In order to furnish our subscribers with acceptable basic costs per cubic foot and costs per square foot, our organization has selected four "guinea pig" houses which we reprice in St. Louis every month using the contractor-bid-price method of computing accurate unit costs for each element of construction. So that com-

COST CURVES FOR T

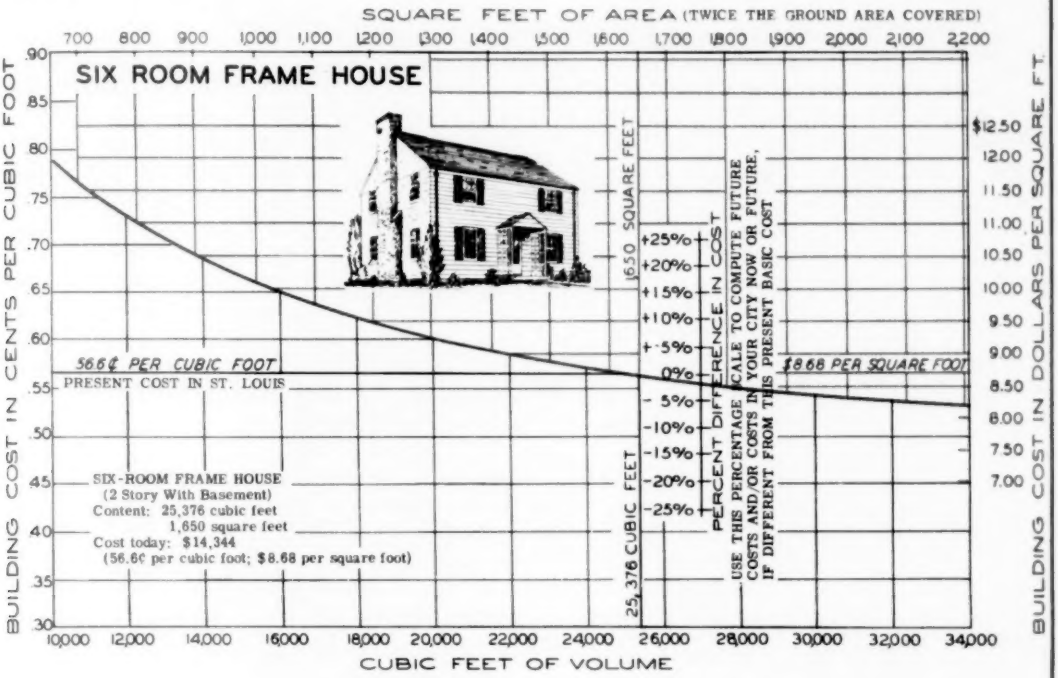
COPYRIGHT – ROY WENZ

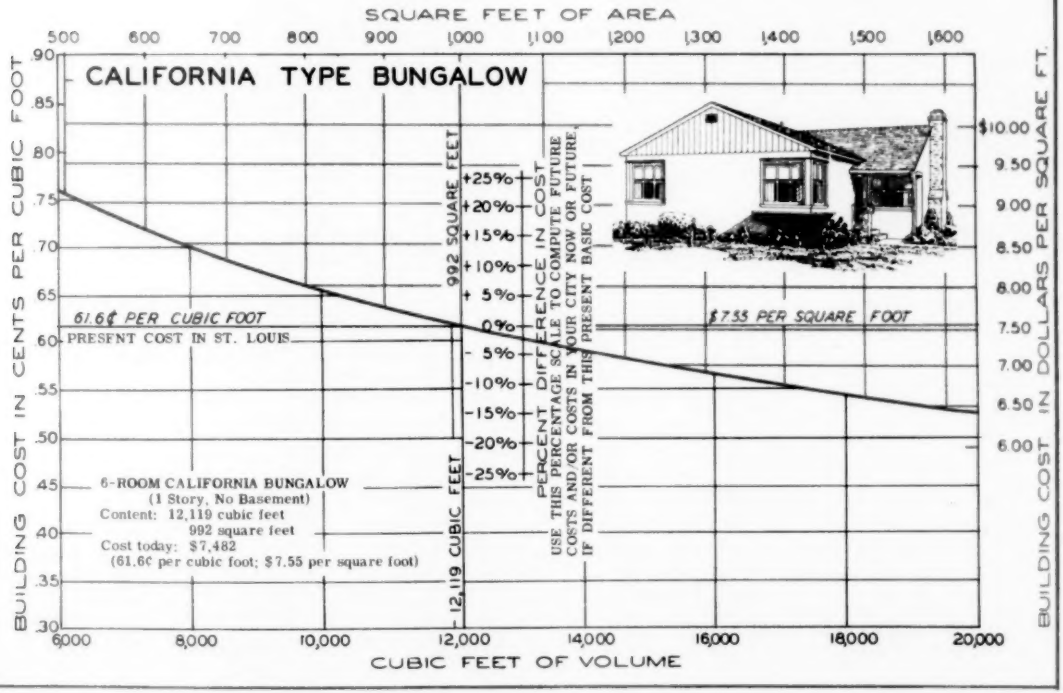

SQUARE FEET OF AREA (TWICE THE GROUND AREA COVERED)
700 800 900 1,000 1,100 1,200 1,300 1,400 1,500 1,600 1,700 1,800 1,900 2,000 2,100 2,200
SIX ROOM BRICK HOUSE
BUILDING COST IN CENTS PER CUBIC FOOT
.90 .85 .80 .75 .70 .65 .60 .55 .50 .45 .40 .35 .30
63.0¢ PER CUBIC FOOT
PRESENT COST IN ST. LOUIS
SIX-ROOM BRICK HOUSE
FRAME INTERIOR
(2 Story With Basement)
Content: 23,100 cubic feet
1,520 square feet
Cost today: $14,537
(63.0¢ per cubic foot; $9.56 per square foot)
1,520 SQUARE FEET
23,100 CUBIC FEET
PERCENT DIFFERENCE IN COST
+25% +20% +15% +10% + 5% 0% 5% -10% -15% -20% -25%
USE THIS PERCENTAGE SCALE TO COMPUTE FUTURE COSTS AND/OR COSTS IN YOUR CITY NOW OR FUTURE, IF DIFFERENT FROM THIS PRESENT BASIC COST
$9.56 PER SQUARE FOOT
$13.50 13.00 12.50 12.00 11.50 11.00 10.50 10.00 9.50 9.00 8.50 8.00 7.50 7.00
BUILDING COST IN DOLLARS PER SQUARE FT
10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 30,000 32,000 34,000
CUBIC FEET OF VOLUME


SQUARE FEET OF AREA
600 700 800 900 1,000 1,100 1,200 1,300 1,400 1,500 1,600
FIVE ROOM BRICK VENEER HOUSE
BUILDING COST IN CENTS PER CUBIC FOOT
.90 .85 .80 .75 .70 .65 .60 .55 .50 .45 .40 .35 .30
51.0¢ PER CUBIC FOOT
PRESENT COST IN ST. LOUIS
FIVE-ROOM BRICK VENEER HOUSE
(1 Story With Basement)
Content: 24,910 cubic feet
1,165 square feet
Cost today: $12,694
(51.0¢ per cubic foot; $10.88 per square foot)
1,165 SQUARE FEET
24,910 CUBIC FEET
PERCENT DIFFERENCE IN COST
+25% +20% +15% +10% + 5% 0% - 5% -10% -15% -20% -25%
USE THIS PERCENTAGE SCALE TO COMPUTE FUTURE COSTS AND/OR COSTS IN YOUR CITY NOW OR FUTURE, IF DIFFERENT FROM THIS PRESENT BASIC COST
$10.88 PER SQUARE FOOT
$16.00 15.00 14.00 13.00 12.00 11.00 10.00 9.00 8.00
BUILDING COST IN DOLLARS PER SQUARE FT
12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 30,000 32,000 34,000 36,000
CUBIC FEET OF VOLUME

TYPICAL BUILDINGS

NZLICK & CO. ~ 1949


SQUARE FEET OF AREA (TWICE THE GROUND AREA COVERED)
700 800 900 1,000 1,100 1,200 1,300 1,400 1,500 1,600 1,700 1,800 1,900 2,000 2,100 2,200
SIX ROOM FRAME HOUSE
BUILDING COST IN CENTS PER CUBIC FOOT
.90 .85 .80 .75 .70 .65 .60 .55 .50 .45 .40 .35 .30
56.6¢ PER CUBIC FOOT
PRESENT COST IN ST. LOUIS
$8.68 PER SQUARE FOOT
SIX-ROOM FRAME HOUSE
(2 Story With Basement)
Content: 25,376 cubic feet
1,650 square feet
Cost today: $14,344
(56.6¢ per cubic foot; $8.68 per square foot)
1650 SQUARE FEET
25,376 CUBIC FEET
PERCENT DIFFERENCE IN COST
+25% +20% +15% +10% +5% 0% -5% -10% -15% -20% -25%
USE THIS PERCENTAGE SCALE TO COMPUTE FUTURE COSTS AND/OR COSTS IN YOUR CITY NOW OR FUTURE, IF DIFFERENT FROM THIS PRESENT BASIC COST
$12.50 12.00 11.50 11.00 10.50 10.00 9.50 9.00 8.50 8.00 7.50 7.00
BUILDING COST IN DOLLARS PER SQUARE FT.
10,000 12,000 14,000 16,000 18,000 20,000 22,000 24,000 26,000 28,000 30,000 32,000 34,000
CUBIC FEET OF VOLUME


SQUARE FEET OF AREA
500 600 700 800 900 1,000 1,100 1,200 1,300 1,400 1,500 1,600
CALIFORNIA TYPE BUNGALOW
BUILDING COST IN CENTS PER CUBIC FOOT
.90 .85 .80 .75 .70 .65 .60 .55 .50 .45 .40 .35 .30
61.6¢ PER CUBIC FOOT
PRESENT COST IN ST. LOUIS
$7.55 PER SQUARE FOOT
6-ROOM CALIFORNIA BUNGALOW
(1 Story, No Basement)
Content: 12,119 cubic feet
992 square feet
Cost today: $7,482
(61.6¢ per cubic foot; $7.55 per square foot)
992 SQUARE FEET
12,119 CUBIC FEET
PERCENT DIFFERENCE IN COST
+25% +20% +15% +10% +5% 0% -5% -10% -15% -20% -25%
USE THIS PERCENTAGE SCALE TO COMPUTE FUTURE COSTS AND/OR COSTS IN YOUR CITY NOW OR FUTURE, IF DIFFERENT FROM THIS PRESENT BASIC COST
$10.00 9.50 9.00 8.50 8.00 7.50 7.00 6.50 6.00
BUILDING COST IN DOLLARS PER SQUARE FT.
6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000
CUBIC FEET OF VOLUME

parisons can be made, we refigure costs in other cities every three months (refer to the August 1949 issue of the Real Estate Analyst) and compute a national average.

We find that although ordinary residential buildings are fixed as to location and are admittedly subject to local conditions to a greater extent than almost all other commodities, nevertheless, real estate activity and prices in different cities and in different sections of the country follow the national pattern very closely. We furthermore find that St. Louis costs are very closely attuned to the national average, usually being about 3% above it. In our computations we refigure every item that goes into the particular building including the corner bead that goes into the plaster, the caulking that goes into the plumbing, and every other item regardless of how small or how large it is. We don't merely say "lumber costs so much," but we know the number of lineal feet of 2 x 4's, 2 x 6's, 2 x 8's, 2 x 10's, etc. Each individual item of material is accounted for, piece by piece, and is refigured every month. Each item of our labor costs and each overhead item is also refigured each month. We wish to be extremely accurate in this determination because we realize how heavily these data are relied upon by appraisers, bankers, and the executives of savings and loan associations through this country and Canada.

The plans and specifications for the "guinea pig" houses have been published previously and are well known to our subscribers. Good quality materials and workmanship are used throughout. Each represents a fundamental and acceptable type of architecture in good taste in most American communities. The California-type bungalow, however, finds its greatest popularity in the southwestern part of the country, where it is built with exterior walls of stucco over metal lath, no sheathing being used on the walls.

In the development of the charts in this bulletin we have used as a starting point the cost per cubic foot and the cost per square foot which we have computed by this method for each of the four typical houses in St. Louis. The curved line on the chart for each house shows the results of our studies in terms of the cost per cubic foot, and cost per square foot of the four "guinea pig" houses, if each house were to be reconstructed new but with greater or lesser cubic content and area than the actual "guinea pig" house.

HOW TO USE THE CHARTS

If you should happen to have for appraisement a house similar in quality and general characteristics but different in size from any of the four typical houses charted in this bulletin, and if you know that the costs in your community at the present time are the same as the costs in St. Louis, the use of these charts is quite simple:

Working on the cubic foot basis, simply find on the lower horizontal scale the number of cubic feet which corresponds to the volume of the house which you have for appraisement, go up that line vertically to where this cubage intersects the curve, then go horizontally to the scale on the left and read directly the cost per cubic foot applicable to that particular house. If you are appraising on the square foot basis, and your costs per square foot are the same as St. Louis' costs per square foot for the particular type of house, the problem is equally simple. Using

the red coordinates and scales at the top and on the right-hand side of the chart, find on the top scale of the chart the number of square feet which corresponds to the area which you have measured for your building under appraisement, go down vertically until you meet the curved line, then read across horizontally, on the right-hand scale, the cost per square foot.

Multiplying the cost per cubic foot by the cubic feet, or the cost per square foot by the number of square feet, will give you the basic cost of your house. To this cost you will have to add, of course, the cost of such things as are not figured in the cubage; for example, open porches, paved terraces, fire escapes, etc., if any.

You may, and quite probably will, find that the present costs in your community are different from those in St. Louis by, let us say, as much as 5%. (The August issue of the Real Estate Analyst reports on costs in fifty-two American cities.) In that event, you may conveniently use the scale of "percentage difference in cost" found in the center of the chart. Proceed as described above to locate the number of cubic feet, or square feet, and go vertically on this line until it intersects the cost-curve. Then proceed further along this same vertical line a distance equal to the distance shown as 5% (above or below the curve if costs in your city are 5% higher or 5% lower), and then read the cost per cubic foot on the left-hand scale or the cost per square foot on the right-hand scale as before, from this point which is 5% distant from the "cost-in-St. Louis" curve.

This scale showing percentage difference in cost is prepared on a mathematical basis and therefore is also applicable to future costs as they may fluctuate. For example, if several months from now in your city you have a house similar in quality, workmanship, and general characteristics to the typical houses described herein, but different in size, you may similarly relate your costs on a percentage basis to the basic costs computed for St. Louis in these charts. Having determined the percentage difference, proceed as before going, as the case may be, above or below the curve on the chart, a distance equal to the percentage difference in cost in your city on the given date, and read the cost per cubic foot from the scale on the left or the cost per square foot from the scale on the right.

For easy reading of the chart, we have shown the coordinates for cubic feet of volume and the building costs in cents per cubic foot in blue. Similarly, for those who prefer to use the square foot method we have shown the coordinates for the square feet of area and the building costs in dollars per square foot in red.

The two-story, six-room brick residence, surprisingly enough, costs more per cubic foot than any of the other three houses shown in this bulletin but it costs less per square foot than the five-room brick veneer house because the attic and basement space is small in comparison with its living space. Two-story construction almost always shows a saving in foundation costs and in roofing costs in comparison with a single-story structure of equivalent living space.

The one-story five-room brick veneer house is simply designed, well arranged and, we feel, typical of many such houses in the United States. It will be noted that as the five-room brick veneer house is built smaller, the costs per cubic foot and per square foot increase more rapidly than those same costs increase in the two-

story brick house, two-story frame house, or the California-type bungalow. On a very small five-room brick veneer house the costs per unit of volume or per unit of area should be expected to be rather high because two building trades are involved: namely, the brickmason's and the carpenter's. Regardless of the size of the house, the cost of making the corners with the two trades would be about the same for a standard height, and therefore would enter as a greater proportion of the total cost. The other three typical houses being studied here do not have this disadvantage to the same extent when they are built in smaller sizes. When this brick veneer house is built quite large, we find that the relative decrease in cost per unit of volume and in cost per unit of area is more in line with those of the other houses: that is, the curves tend to be more nearly parallel as the houses become larger. This five-room brick veneer house costs less per cubic foot to build than any of the other three houses studied but costs more per square foot of floor space than any of them. This is because of the large attic space and the large basement space in comparison with the amount of finished space inherent in this type of architecture.

The curve relating the different costs per cubic foot or per square foot as the two-story, six-room frame house is erected either smaller or larger than the basic plans specify, very closely parallels the cost-curve of the two-story brick residence but is about 6¢ less expensive per cubic foot and about 87¢ less per square foot in the middle portions of the curves. This difference tends to diminish as both of these two-story houses become larger and to become more accentuated as these buildings become smaller. As the two-story brick building becomes smaller, its costs per cubic foot and per square foot increase more rapidly than do the costs of the two-story six-room frame house for the same volume and/or area.

The California-type bungalow is a one-story structure with no basement. It has exterior walls of stucco over metal lath. No sheathing is used on the walls. It will be recognized immediately that the construction of this bungalow would not be permitted - nor would it be a satisfactory home - in many of the cities in the northern part of the United States. Its construction, for example, is not permitted within the city limits by the St. Louis building code. Nevertheless, this type of building is exceedingly popular in the southwestern part of the United States and is typical of much of the construction there.

This is an inexpensive house of average construction for its type. Its cost per square foot if built in the St. Louis regional area (outside of the city limits) would be lower per square foot than any of the other three houses described in this bulletin. On the other hand, because of its very small cubic content (the roof pitch is low and it has no basement) the cost per cubic foot is quite high. The simplicity of architectural detail in this house makes the cost curve rather flatter than the other three cost curves as the volume and area of this house become smaller. As the volume of this house is increased the cost curve tends to more nearly parallel the cost curves of the other three typical houses described in this bulletin.

In concluding, we must repeat again that there is no substitute for broad experience and good judgment on the part of the appraiser. We submit these cost-curves as a convenient tool to assist appraisers in formulating sound judgment. Those whose breadth of experience has encompassed the extremes in residential appraising as well as the averages will appreciate our contribution to this field.